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The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries: Cambodia, China, Indonesia, Laos, Malaysia, Papua New Guinea, the Philippines, Sri Lanka, Thailand, and Viet Nam. Its goal is to strengthen local capacity for the economic analysis of environmental problems so that researchers can provide sound advice to policymakers.

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Do Marine Protected Areas Work? : A Case Study From The Philippines

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Across Southeast Asia, fishermen are finding it harder and harder to land the catches they need. Overfishing, habitat destruction and marine pollution have significantly damaged fish stocks and fish breeding grounds throughout the region. →

A summary of EEPSEA Research Report 2004-RR6, *A Fishery in Transition: Impact of a Community Marine Reserve on a Coastal Fishery in Northern Mindanao, Philippines* by Asuncion B. de Guzman, Mindanao State University at Naawan, 9023 Naawan, Misamis Oriental, Philippines (Contact : rufo@edsamail.com.ph).

The MPA has helped improve

In an attempt to reverse this decline, many countries have set up marine protected areas (MPAs). The idea behind such projects is twofold: not only are the reserves meant to provide a safe haven for fish and other marine flora and fauna to breed and flourish, they are also meant to help surrounding fishing areas recover by 'seeding' surrounding waters with fresh fish stocks.

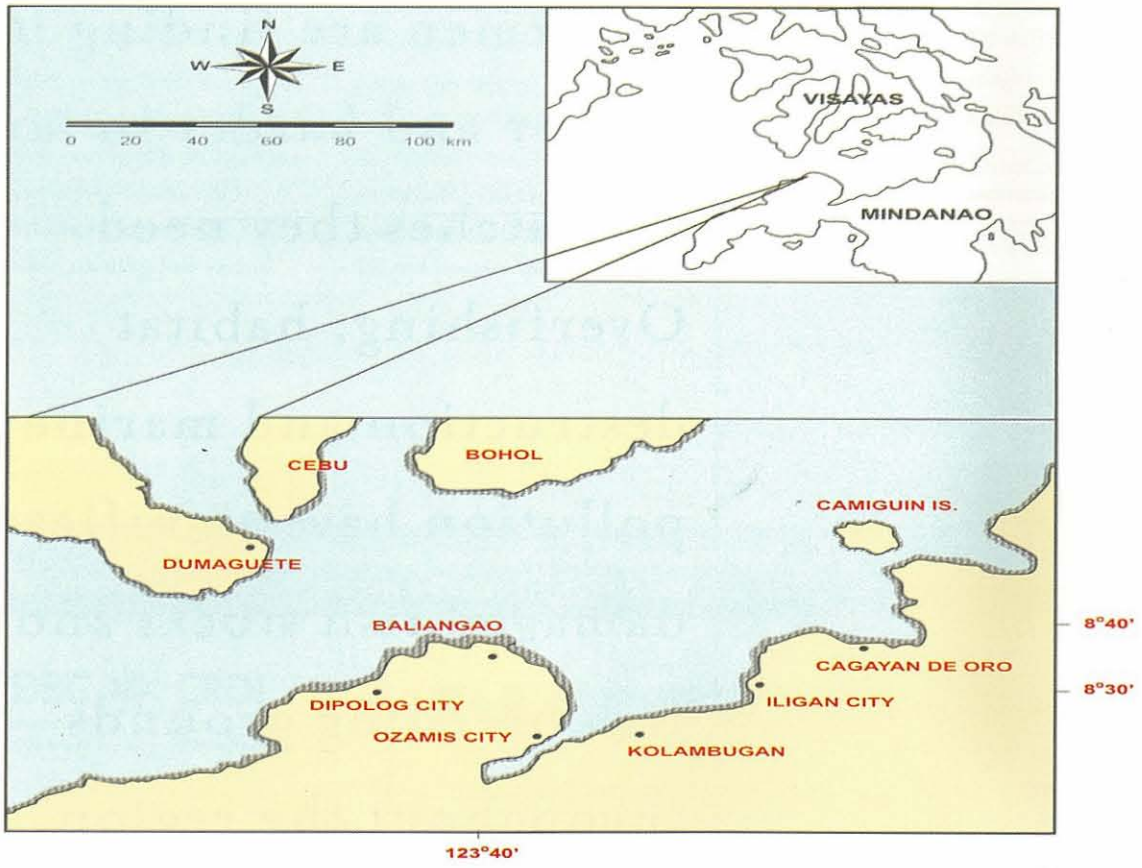
A new report from the Philippines has investigated one such MPA to see how it has performed and to find out whether it actually benefits surrounding fishing areas.

The results of the study are an endorsement for this approach to fishery conservation. They show that the establishment of the MPA has helped improve habitat quality, fish biodiversity, and fish biomass within the reserve area. There are also strong indications that it has enhanced the economic profitability of the surrounding coastal fishery areas. Given better enforcement and support, it is thought that the zone could make a significant contribution to the sustainable development of fishing in the region – and that it could be a model for other regions where fishing is in crisis.

The Marine Reserve

Asuncion B. de Guzman from the Mindanao State University carried out this one-year study. She looked at the Baliangao Protected Landscape and Seascape (BPLS) reserve. This 74-hectare marine protected area is a mangrove, seagrass and coral reef ecosystem with a core area of about five hectares. It is located in Danao Bay, Baliangao, Misamis Occidental, which opens into the Mindanao Sea.

The reserve was established in 1991 as the Misom Sea Sanctuary. It was later expanded and it is now an excellent example of a community-



Northern Mindanao and Danao Bay

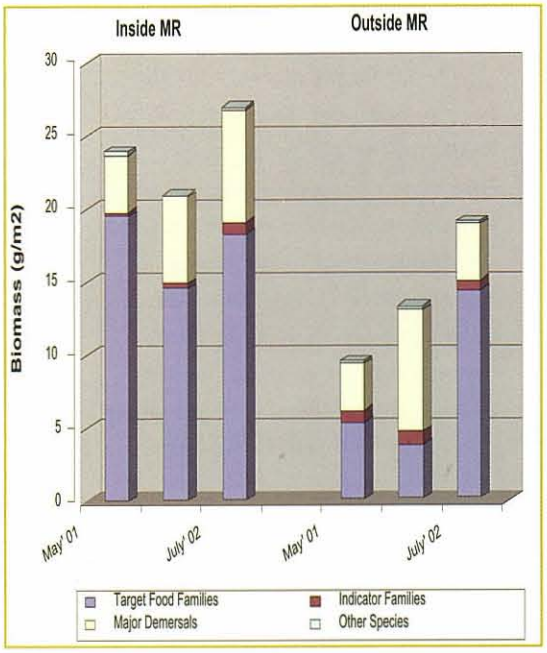
habitat quality and fish biodiversity

based marine reserve. Strict 'no fishing' regulations are implemented inside the sanctuary, which is largely managed by a federation of people's organizations drawn from the six coastal villages or 'barangays' that fringe the bay. Support is also given by a local environmental NGO, the Pipuli Foundation. Fishermen in the surrounding waters of Danao Bay mainly use small-scale fishing equipment and, due to adverse weather, are confined to shallower areas for much of the year. Fishing in the region has, however, been badly affected since the 1980's by over-exploitation of fish stocks and the destruction of coastal mangrove forests for charcoal production and fishpond development. Non-resident fishers, or so-called 'strikers', from neighbouring towns, have also increased fishing pressure in the bay.

Do MPAs Work?

De Guzman's research was driven by the desire to find a sustainable solution to the region's fishing problems and to provide information on the role of MPAs in fishery conservation. Although there are a lot of data on how MPAs improve the biodiversity of the areas in which they are set up, data on the ability of marine reserves to enhance fisheries in surrounding areas through biomass 'spill over' is meagre and normally relies on circumstantial evidence.

Biomass of fish groups in reefs inside and outside the marine reserve.



To get more concrete information, de Guzman first investigated current levels of biodiversity in the marine reserve and in its surrounding waters. This was done by monitoring overall species diversity and the abundance of fish populations around six strategically placed dive sites. Particular attention was given to large predators, such as groupers, and other species that have high economic value to fishermen.

Once a picture of current levels of biodiversity had been obtained, past biodiversity surveys from groups such as the Pipuli Foundation were gathered and cross-referenced to get an indication as to whether biodiversity had improved or not.

The Economics of Fishing

To find out whether the MPA had benefited surrounding fisheries, de Guzman looked at how the fishermen had fared both economically and in terms of fish catches. Because the fisheries around the MPA are open-access and were over-fished, she argued that if people were making a sustainable living from the fisheries, then the reserve must be acting as a source of new fish stocks.

A combination of strategies was used to get information on current levels of fish catches. Whenever possible, a participatory approach was employed where fishermen recorded their catches on prepared data forms. Logbooks were also left with fish buyers to collect data and field enumerators recorded catches as they arrived from the sea.

To get a picture of how fish catches translate into profits, a survey of costs and off-vessel prices of fish was conducted on a random sample of fishermen. Data on past fish catches were obtained from a detailed resource-users survey conducted by the Pipuli Foundation in 1998. A participatory method known as 'focus group discussion' was also used. Through this method, older fishermen helped construct a fishery history for fish and invertebrate production in the bay.

Increased Biodiversity, Increased Fishing

The study found that the establishment of the MPA has had a

significant positive effect on the overall ecological condition of both the Baliangao marine reserve area and of some of the reefs outside it. In comparison to the years following the establishment of the marine reserve, de Guzman found improved live coral cover and mangrove diversity, and increases in fish diversity and populations.

A number of related findings gave a further strong indication that the MPA had also had a positive impact on surrounding fish stocks and fisheries. Observations of fish movements found that large adult 'food' fish, such as emperors, rabbitfish and snappers, frequently moved out of the sanctuary core. It was also found that the juvenile populations of important food fishes inside the sanctuary were almost certainly the source of young fish caught outside the reserve.

Data on fish corral catches indicated a slight increase in daily catch rates from 1.3 kg/day in 1997 to 2.29 kg/day in 2001-2002. This suggested that the sanctuary had helped protect spawning fish and so helped boost catches. In addition, an economic analysis of fish catches in the region showed that without the MPA, people would get zero return from fishing – again pointing to the importance of the reserve in keeping fish stocks viable.

The ecological evidence for the positive impact of the reserve on fishing was backed up by the fishermen themselves. Some of these locals claimed increased catches since the establishment of the marine reserve. Over 73% supported the reserve and a large number of these believed that the sanctuary helped increase fish abundance by providing protection for breeding populations.

Giving MPAs a Hand

De Guzman concluded that, although a definitive answer on biodiversity 'spill over' would have to wait for the results of a future research project using fish tagging, it was clear that the reserve was playing an important part in transforming Danao Bay into a sustainable fishery area. She cautioned that this process was, helped protect spawning fish and so the region's coastal fishery is still open-access and in distress: Poaching occurs, fish stocks are dominated by small, low value fish, daily gross incomes remain small and profits are small or marginal.

She concluded that if the MPA is to be fully effective, other policy instruments and fishery management strategies are needed to back it up. She therefore recommended a reduction in overall fishing effort in Danao Bay. This could be achieved by excluding non-residents, issuing strict fishing permits and implementing effective policing and stiffer penalties.

She also recommended that an integrated management body be set up to implement an overall coastal development plan for the bay. This, along with improved public information and improved community management of the reserve, should ensure that the positive impact of the MPA is fully capitalised upon – a model for a fishery system where biodiversity is restored, protected and conserved.

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